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INDUSTRIALIZATION AND SOCIAL DEVELOPMENT, 1960-1980*

Social Aspects of Industrialization — Working Papers

Prepared by the

Global and Conceptual Studies Branch

Division for Industrial Studies

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INDUSTRIALIZATION AND SOCIAL DEVELOPMENT, 1960-1980

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FOREWORD

As a reflection of deliberations at the Third General Conference of UNIDO in New Delhi in 1980, a recurrent theme at recent sessions of UNIDO's Industrial Development Board has been the need to give proper attention to the examination of the social aspects of the overall industrialization process. Moreover, this renewed interest in the interrelationships between the social and the economic spheres has received additional support by a widespread consensus in development theory (e.g., Kindleberger-Herrick 1977, Todaro 1983), indicating that economic development can create the means to meet specific targets in social areas like nutrition, health, education, communication, or housing; and that improvements in social standards are an indispensible prerequisite for fostering economic growth.

While continuing to examine the social aspects of industrialization as an integral part of a number of UNIDO research projects, a specific research programme in this area was instituted in 1982 which in its present stage has adopted the concept of socio-economic indicators as a means for providing a composite picture of the multidimensional development process. Drawing extensively on the work of other UN agencies, a data base of socio-economic indicators has been collected and processed, and three cross-sectional and intertemporal surveys at the global level (UNIDO 1982, UNIDO 1983a, UNIDO 1983b) have been published. The present study extends the sphere of investigation into the causal relationships between social and economic aspects of industrialization, with the ultimate objective of assisting those encharged with industrial development policy formulation in the developing countries to assess the impact and implications of industrialization policies on the process of socio-economic development.

The present study was prepared jointly by Mr. Karl Müller, a junior consultant working for the Secretariat, and the UNIDO Secretariat.

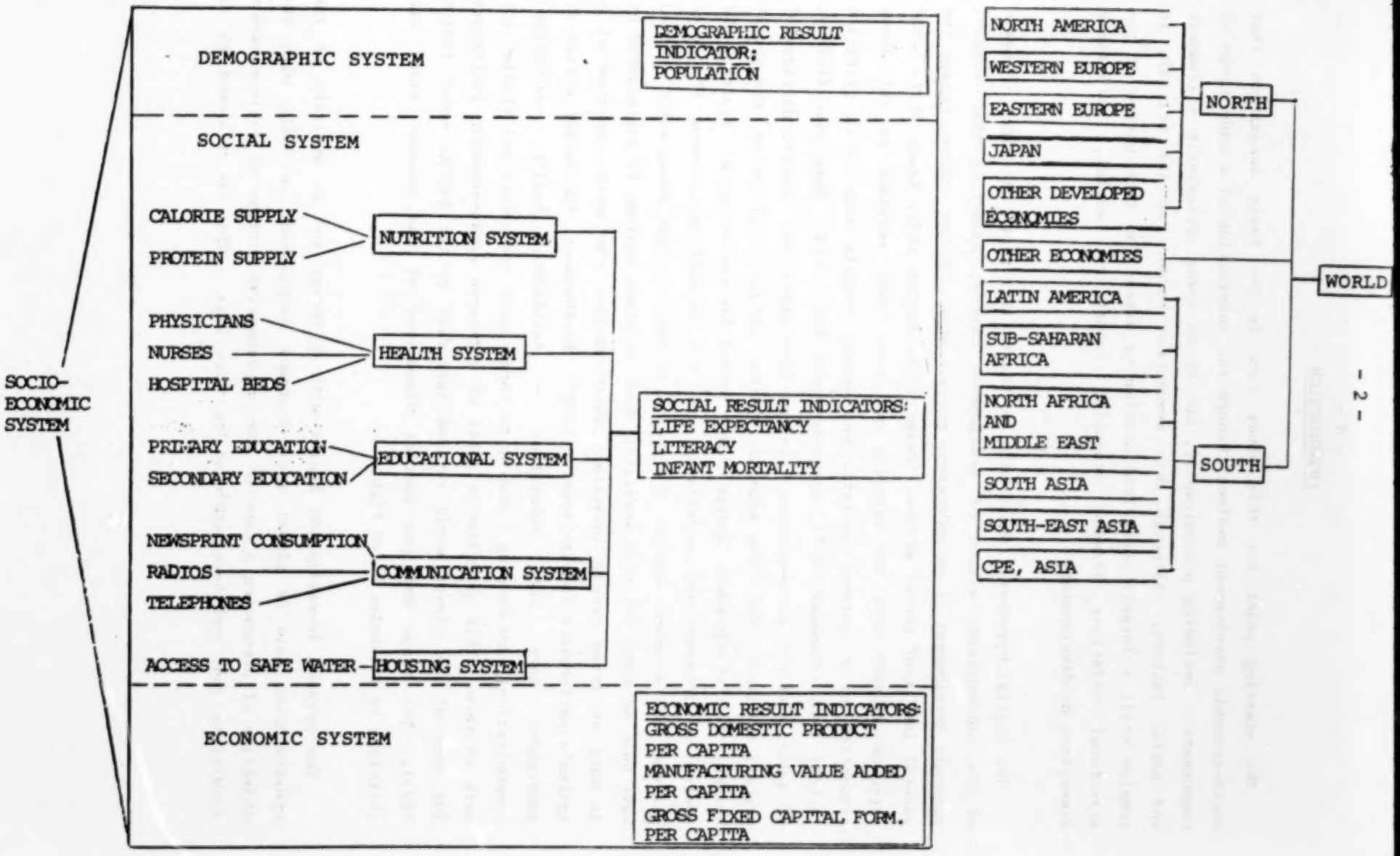
INTRODUCTION

The starting point for this study lies in the basic assumption that socio-economic development evolves through the interaction of a wide range of components - including predominantly, but by no means exclusively - economic and social factors. Although this assumption borders on the trivial, it remains still a largely unresolved problem to assess the true nature of the structural relations between economic, industrial, social, and other dimensions of development.

The initial hypothesis which will be tested throughout the paper is based on the conventional wisdom of development theory, asserting that overall economic development is an endogenous process which, in due course, raises the general levels of social welfare (Meier 1968, Rostow 1971, Bauer 1972). The approach adopted here for carrying out some tests relevant to the above assumption is a systems theoretic one using, despite some valid criticism (Ackoff 1976, Townsend 1977), socio-economic indicators. More specifically, of seven distinct socio-economic systems into which the overall development process can be divided - the economic system, the political system, the social system, the demographic system, the scientific-technological system, the system of international relations, and the natural environment [1/] three systems (the economic system, the social system, and the demographic system) have been selected for this analysis. Each of these systems is represented by as many as three result indicators which measure the whole spectrum of a system's performance (Hicks-Streeten 1979). Furthermore, the social system is subdivided into five subsystems - nutrition, health, education, communications, and housing - and up to three input indicators are studied for each of them. This generates a total of eighteeen socio-economic indicators for each of the eleven world regions specified in the UNITAD model (UNIDO 1981). The scope and the spatial dimensions of the present study can therefore be presented as on Figure 1.

The present investigation begins with a survey and an analysis of the cross-section data on global socio-economic development in 1980, with the objective of presenting a concise and comprehensive picture of socio-economic conditions that had been achieved by this date. This is followed by an

FIGURE 1: DIMENSIONS OF THE PRESENT STUDY



intertemporal analysis of socio-economic indicators for the period 1960-1980 which attempts to put the state of development attained in 1980 in the perspective of the preceding two development decades. The second part of the study has the aim, through measuring incremental changes in social and economic conditions, of indicating the various paths which social and economic systems, in different regions of the world, have followed from 1960 to 1980 and of the pattern of interaction that has taken place between the economic and social systems as industrialization has proceeded.

PART I: SOCIO-ECONOMIC DEVELOPMENT IN 1980

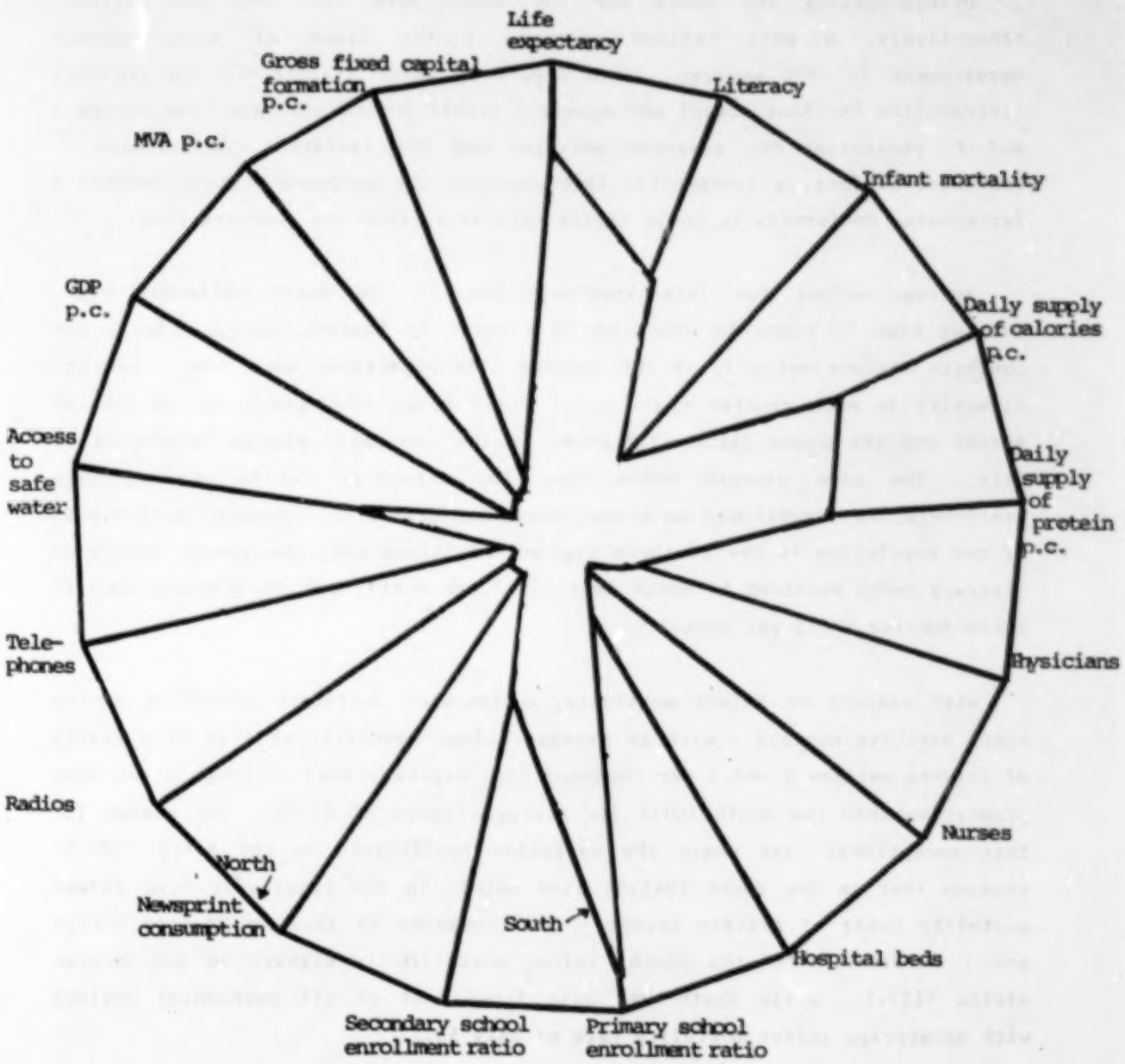
THE DIMENSIONS OF GLOBAL AND REGIONAL SOCIO-ECONOMIC DEVELOPMENT IN 1980

Dimensions of Global Development

As an introductory assessment of the relative position of the developing relative to the developed regions of the world, Figure 2 shows the result of calculating weighted averages of seventeen social and economic indicators and expressing them as a percentage of the average standards of the Northern countries. As can be easily seen in each dimension the level of the indicators for the developed countries far exceeds that for the developing group: nutritional indicators for the South vary between 68 per cent (calorie supply) and 58 per cent (protein supply), while health care inputs average only around 15 per cent of those of the North. Primary and secondary enrollment ratios, while near or around 100 per cent in the North, exhibit a startling discrepancy in the South: for primary enrollment one observes what is probably the South's best relative performance, with an average primary enrollment ratio of more than 90 per cent. This, however, does not carry over to secondary levels, where the rate falls to 35 per cent. A similar disparate result occurs within the communications system, where newsprint consumption, radio receivers, and telephones attain, on average, only 6.4 per cent of the level of the developed group. Additionally, there is clearly a poor relative performance in the housing area for the South, where more than 60 per cent of the dwellings are without safe water.

Turning now to the social result indicators of life expectancy, literacy, and infant mortality - so-called because they can be held to represent the results of the whole process of social development as reflected by the above indicators - the same clear picture of the development disparity between the North and the South comes forth: people in the South live, on average, 17 years less; almost 45 per cent of the South is illiterate; and more than five times as many infant deaths occur in the South. Add to this the indication that the South, in its three economic result indicators (of GDP per capita, manufacturing value added (MVA) per capita, and gross fixed capital formation per capita), has achieved an average of only 9.5 per cent of the northern standards, and the bias in global socio-economic development becomes very clear. Moreover, taking the centrally planned economies of Asia, and those of Sub-Saharan Africa - for which data are rather limited - into full account would generally lower the averages for the South appreciably, thus accentuating the development gap.

FIGURE 2: THE GLOBAL SOCIO-ECONOMIC NORTH-SOUTH GAP, 1980



Notes and Sources: See Appendix 1.

Dimensions of Regional Development

Disaggregating the North and the South into five and six regions, respectively, a more refined picture of the state of socio-economic development in 1980 emerges. From Figure 3, which illustrates the regional distribution for four social and economic result indicators, and from Tables 1 and 2, presenting the weighted averages and the variation coefficients [2/] for these regions, a fundamental fact emerges: the northern regions exhibit a far greater conformity in their social indicators than the southern bloc.

Average values for life-expectancy are in the North uniformly high, ranging from 76 years in Japan to 72.2 years in Eastern Europe. Among the Southern regions not only is the average life expectancy much lower, but the diversity in much greater - the lower limit being 47.4 years in Sub-Saharan Africa and the upper limit 63.9 years in the centrally planned economies of Asia. The same picture holds true for literacy: while the northern hemisphere has established an almost universal degree of literacy, nearly half of the population in the southern regions is illiterate, the lowest levels of literacy being recorded in South Asia (35.3 per cent), and the highest ones in Latin America (78.5 per cent).

With respect to infant mortality, a somewhat different situation occurs since northern nations - with an average infant mortality rate of 16.4 deaths of infants between 0 and 1 per thousand live births - vary in roughly the same proportion than the South (with its average figure of 88.8). The reason for this exceptional case where the variation coefficient in the North (290.2) exceeds that in the South (245.8) lies mainly in the relatively high infant mortality rates of Eastern Europe - 25.3 compared to 12.7 in Western Europe and 7 in Japan. For the South, infant mortality is highest in Sub-Saharan Africa (127.1), while South-East Asia fares best of all developing regions with an average infant mortality rate of only 56.2.

For the nutritional sub-system, the highest average daily supply of calories per capita is recorded in North America (3631 calories) and the lowest in South Asia (1931 calories); and the same picture holds for the daily supply of protein per capita. Moreover, it is interesting to note that Japan, despite its exceptional performance in almost all other indicators, has one of the lowest calorie and protein supply figures of all developed countries, alerting one to the fact that international rankings in the nutritional area

FIGURE 3: COMPARATIVE VALUES FOR FOUR SOCIAL AND ECONOMIC INDICATORS

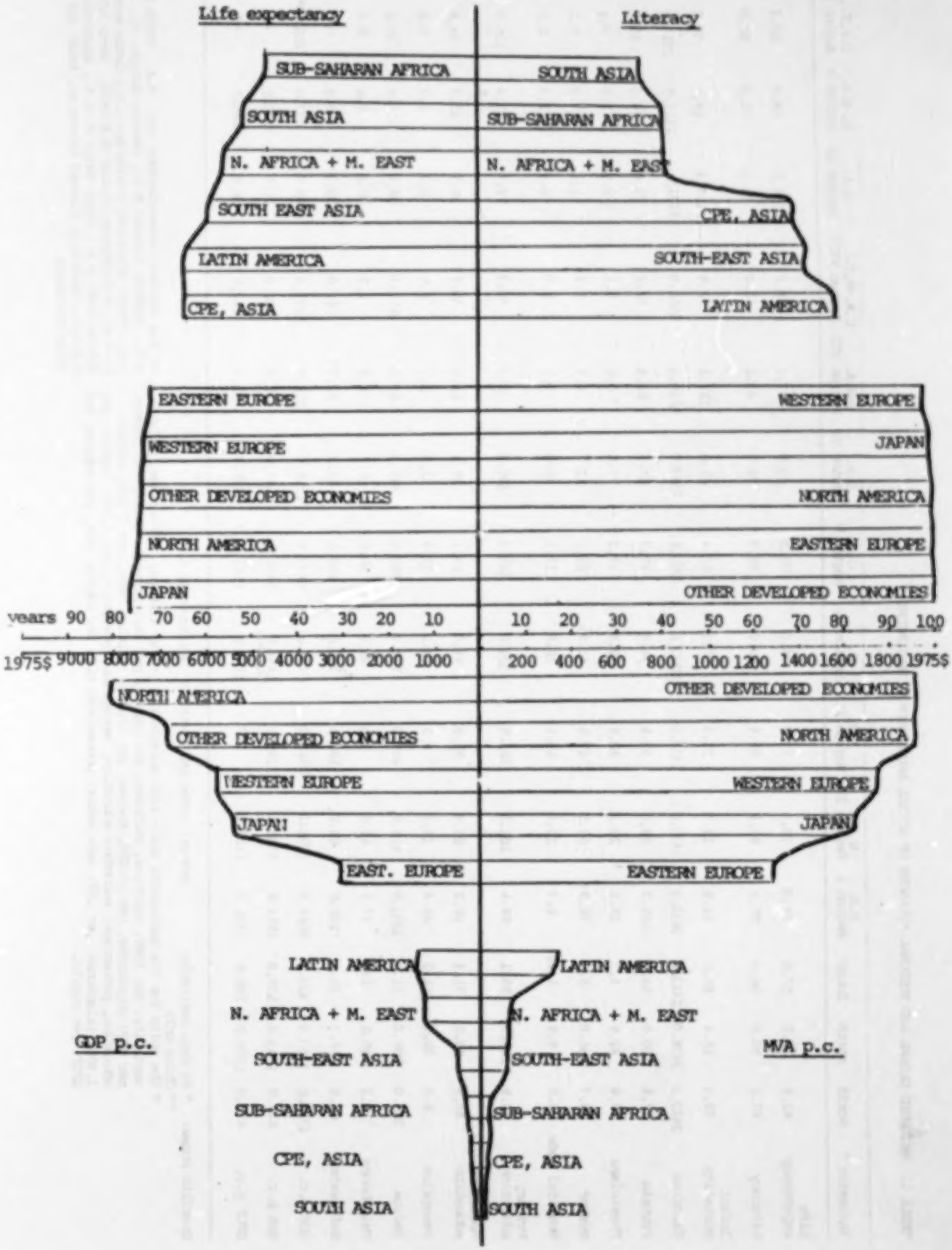


TABLE 1: WEIGHTED GLOBAL AND REGIONAL AVERAGES OF SOCIAL AND ECONOMIC INDICATORS ++

Indicator +	World	North	South	N.A. Region I	W.E. Region II	E.E. Region III	J. Region IV	O.D. Region V	L.A. Region VI	S-S.A. Region VII	N.A.+M.E. Region VIII	S.A. Region IX	S.-E.A. Region X	C.P.E.,A. Region XI	O.E. Region XII
Life expectancy	61.6	73.0	57.5	74.0	73.3	71.2	76.0	73.8	63.8	47.4	56.0	51.2	58.8	63.9	63.9
Literacy	67.3	98.8	56.0	99.0	97.8	99.4	99.0	99.8	78.5	40.1	41.0	35.3	71.9	69.9	69.4
Infant mortality	70.4	16.4	88.8	12.8	12.7	25.3	7.0	11.4	65.8	127.1	91.4	124.3	69.0	56.2	90.9
Calories	2612.0	3426.0	2312.0	3631.0	3473.0	3413.0	2912.0	3257.0	2568.0	2210.0	2584.0	1931.0	2417.0	2514.0	3046.0
Protein	67.6	100.0	58.3	105.3	98.0	99.8	94.9	97.7	67.5	51.4	72.2	47.6	54.3	65.8	85.7
Physicians	8.8	22.6	4.3	19.1	20.2	30.8	12.8	17.3	7.5	0.6	5.1	2.5	1.8	5.4	10.0
Nurses	18.7	56.8	5.3	70.9	59.5	47.9	41.7	82.1	11.7	4.8	7.3	1.8	7.3	5.2	21.0
Hospital beds	3.8	9.8	1.66	6.4	10.0	11.6	10.6	12.1	2.8	1.5	1.8	0.7	1.2	2.2	4.4
Primary education	96.9	101.7	95.1	98.2	103.5	103.6	101.0	109.1	105.2	78.8	85.2	73.1	99.4	116.5	100.1
Secondary education	46.9	90.0	31.4	96.2	83.4	91.9	91.0	85.1	39.4	14.6	39.2	25.2	42.7	34.8	53.3
Newsprint	6.3	20.4	1.3	48.4	16.2	4.3	22.2	32.4	3.2	0.3	0.6	0.3	2.3	1.6	3.8
Radios	263.0	808.0	71.0	1951.0	416.0	408.0	777.0	888.0	263.0	64.0	114.0	38.0	111.0	15.0	126.0
Telephones	12.2	40.0	1.5	77.8	42.5	9.9	46.0	50.0	6.7	1.3	2.2	0.4	2.8	0.4	8.4
Safe water	61.8	99.7	39.2	100.0	99.0	100.0	100.0	100.0	65.5	22.7	61.0	32.9	29.2	-*	83.3
GDP p.c.	1726.0	5353.0	424.0	8069.0	5796.0	2585.0	5473.0	6872.0	1316.0	351.0	1203.0	158.0	492.0	202.0**	1438.0
MVA p.c.	624.0	1543.0	139.0	1914.0	1751.0	1289.0	1656.0	1920.0	346.0	30.0	126.0	26.0	110.0	-*	353.0
GFCF p.c.	473.0	1359.0	159.0	1348.0	1339.0	-*	1795.0	1581.0	365.0	81.0	367.0	36.0	146.0	-*	273.0

Specific Notes: * No data available.
** China only.
+ The units for the indicators are: Life expectancy, years; literacy, percentage; infant mortality, per 1000; calories, calories, per person, per day; protein, grams, per person, per day; physicians, per 10,000; nurses, per 10,000; hospital beds, per 1,000; primary education, percentage; secondary education, percentage; newsprint, per 1,000; radios, per 1,000; telephones, per 100; safe water, percentage; GDP, per capita; MVA, per capita; and GFCF, per capita.

General Notes and Sources: See Appendix 1.

++ The regional abbreviations are: N.A., North America; W.E., Western Europe; E.E., Eastern Europe; J., Japan; O.D., Other Developed Economies; L.A., Latin America; S.-S.A., Sub-Saharan Africa; N.A.+M.E., North Africa and Middle East; S.A., South Asia; S.-E.A., South-East Asia; C.P.E.A., Centrally Planned Economies, Asia; and O.E., Other Economies.

TABLE 2: VARIATION COEFFICIENTS FOR SOCIAL AND ECONOMIC INDICATORS+

Indicator	World	North	South	N.A. Region I	W.E. Region II	E.E. Region III	J. Region IV**	O.D. Region V	L.A. Region VI	S.-S.A. Region VII	N.A.+M.E. Region VIII	S.A. Region IX	S.-E.A. Region X	C.P.E.A. Region XI	O.E. Region XII
Life expectancy	91.0	14.0	77.1	0	5.3	4.7	-	2.2	26.0	29.6	35.9	81.4	66.5	30.9	36.9
Literacy	236.1	16.5	227.2	0	20.1	12.0	-	1.6	57.7	155.4	111.6	356.0	117.4	139.2	105.6
Infant mortality	383.0	290.2	245.8	72.6	167.9	129.0	-	28.8	122.5	69.4	85.8	161.0	243.7	151.3	302.0
Calories	135.3	43.0	90.7	37.0	23.6	26.0	-	26.5	60.6	46.4	57.2	69.9	65.4	87.8	52.3
Protein	179.9	36.0	128.9	35.3	35.1	23.9	-	28.9	95.5	58.2	53.0	136.3	153.3	120.0	54.8
Physicians	722.4	237.0	837.0	25.5	140.6	208.7	-	27.7	231.2	168.0	276.7	241.2	688.5	735.9	339.6
Nurses	829.3	232.6	593.6	291.0	231.3	133.1	-	12.8	226.7	275.8	300.4	619.8	707.3	545.2	517.6
Hospital beds	651.5	171.0	489.3	206.0	122.6	109.5	-	29.7	201.0	228.2	159.3	613.2	480.9	909.8	323.6
Primary education	123.3	34.6	144.1	9.5	57.0	29.3	-	7.5	59.8	117.5	92.9	164.6	47.4	27.8	8.0
Secondary education	376.7	84.6	269.4	38.7	54.2	132.1	-	9.6	123.8	408.9	159.0	313.9	326.2	211.0	240.4
Newsprint	1252.4	553.2	835.8	106.9	290.2	180.9	-	163.6	265.5	452.2	654.9	427.8	961.7	404.1	373.1
Radios	1108.4	534.1	853.5	223.1	280.5	197.1	-	-**	153.4	402.5	198.6	431.3	825.9	602.3	233.6
Telephones	1165.1	419.9	1316.8	60.9	128.7	261.7	-	20.0	261.8	341.9	346.8	375.9	1330.8	484.6	481.2
Safe water	298.4	20.7	271.5	0	28.2	0	-	0	93.8	146.9	109.9	323.5	539.2	-*	115.9
GDP p.c.	888.6	266.9	919.5	9.3	175.2	140.9	-	73.9	171.4	217.2	542.7	264.1	610.9	-**	271.4
MVA p.c.	687.8	235.0	531.8	63.7	204.4	177.7	-	104.9	219.3	267.4	310.7	385.1	868.8	-*	377.9
GFCF p.c.	700.6	213.4	970.7	167.3	203.1	-*	-	97.8	218.4	292.3	536.5	452.5	650.4	-*	474.9

Specific Notes: * No data available
** Only one value available.

General Notes and Sources: See Table 1 and Appendix 1.

require additional adjustments for different average body weights and energy requirements.

In the health care sub-system, North America and Western Europe, despite their high levels of life expectancy, are surpassed in the number of physicians per 10,000 by Eastern Europe while for nurses per 10,000 the situation is reversed. An interesting variation in health care is present in the developing countries, where Latin America - with the highest per capita GDP - has also the highest performance levels (7.5 physicians and 11.7 nurses per 10,000), but is followed closely by the centrally planned economies of South-East Asia which, despite their low GDP per capita figures, record averages of 5.4 physicians and 5.2 nurses per 10,000.

With respect to the educational sub-system, primary education enrollment rates in the developed countries tend to average around 100 per cent - due to various statistical and definitional problems not only do values for many countries exceed 100 per cent but a number of highly developed nations show values around 90 per cent - and in the developing world only Sub-Saharan Africa, North Africa and the Middle East, and South Asia do not reach primary enrollment rates of 90 per cent or higher. In secondary enrollment rates North America (96.2 per cent) stands atop the developed regions, and South-East Asia (42.7 per cent) and Latin America (39.4 per cent) lead the developing countries.

In communications, by far the highest numbers for newsprint consumption per 1000, radios per 1000, or telephones per 100 are to be found in North America (48.4, 1951, 77.8, respectively), whereas the lowest levels for communication indicators are recorded for South Asia (0.34, 38, and 0.36, respectively). This extreme divergence of communications standards raises doubts whether, in selecting indicators typical for 'postmodern societies' (Bell 1973) anything like sufficient attention is given to the more informal communications network of developing regions.

Data for housing statistics are quite scarce and it is therefore difficult to assess the overall situation for 1980. Available data on the percentage of dwellings with access to safe water, however, show a marked discrepancy between the developed countries - with a universal level of 100 per cent access to safe water except for Portugal - and the developing areas where the highest average figures can be found in Latin America (65.5 per cent) and the lowest ones in Sub-Saharan Africa (22.7 per cent).

THE INTERRELATIONSHIP BETWEEN SOCIAL AND ECONOMIC DEVELOPMENT

In this section standard statistical techniques have been applied to the socio-economic data for 1980 in order to investigate structural links within and between the social and the economic systems. Three groups of results deserve special attention.

Variations across Systems

First, the variation coefficients in Table 2 not only show significant North-South differences, but one can also easily observe a distinctive hierarchy in the variations for the four social sub-systems or dimensions themselves. Excluding housing, for which no comprehensive and reliable set of data - including those on access to safe water - exists, the aggregated picture that emerges is shown on Table 3.

TABLE 3: AVERAGE VARIATION COEFFICIENTS FOR FOUR DIMENSIONS OF THE SOCIAL SYSTEM

Social Dimensions	Average variation coefficients		
	World	North	South
Communication	1175.3	502.4	1002.0
Health	734.4	213.5	640.5
Education	250.0	59.6	206.8
Nutrition	157.6	39.5	109.8

Notes and Sources: See Appendix 1.

Since the differences in the variation among the four social sub-systems are remarkably high, it can be assumed that these four dimensions are characterized by different substitution patterns and assemblage possibilities. This, in turn, would suggest that, at least for social sub-systems like health and communication, any degree of economic development can be accompanied by a functionally equivalent multiplicity of diverging social performance levels. Moreover, the substantially lower variation coefficients for nutrition and, to a lesser extent, for education lend considerable support to a hierarchical conceptualization (Baier-Rescher 1969, Bossel-Hughes 1974) of the different dimensions of the social system.

Coherence within Systems

The last two points seem interesting enough to be investigated further. Since the variation coefficients for the indicators of a particular social sub-system behave roughly similarly, it appears appropriate to explore whether this similarity carries over to the links among the indicators of a specific sub-system as well. A suitable way to detect these intra-systemic patterns is through a stepwise regression procedure which, for a given number of independent variables, specifies the one variable linear regression model with the highest correlation coefficient (R^2), goes on to the two variable case with the maximum R^2, and iterates this maximum R^2 improvement technique up to the total number of independent variables specified at the outset.

Consequently, for the purpose of the present problem, each of the eighteen socio-economic indicators was taken as a function of the remaining seventeen ones. The initial hypothesis was for two types of results: cases in which indicators for a particular system did not exhibit close connections among themselves which would be reflected by 'late' rankings and insignificant R^2 improvements, and cases where indicators of a specific system, by 'early' rankings and significant R^2 contributions, were highly correlated among themselves. Table 4 presents the results of the stepwise regression analysis, lists for each of the social and economic systems the rankings of their constituent indicators, and indicates whether these ranks are to be qualified as significant or not. (Insignificant ranks are in brackets.) 3/

Quite surprisingly, the inner links within the six socio-economic dimensions follow very different lines. Assuming sufficient data reliability, health care and education show very loose connections among their specific indicators, suggesting that, although measuring aspects of the same system, the levels of these dimensions are only weakly linked; and that, in specifying intersystemic relations, more than one indicator of these two systems may be used simultaneously as explanatory variable in a socio-economic model equation. On the other hand, the economic indicators, the social result indicators, nutrition, and communications turn out to be closely linked. This implies that, although measuring different aspects of a socio-economic system, the levels of these intra-systemic dimensions are, nevertheless, highly connected, and that, in building structural relationships, not more than one

TABLE 4 : RESULTS OF THE STEPWISE REGRESSION ANALYSIS I: THE INTRA-SYSTEMIC LINKS

	WORLD			NORTH			SOUTH		
	Life expectancy	Literacy	Infant mortality	Life expectancy	Literacy	Infant mortality	Life expectancy	Literacy	Infant mortality
Life expectancy	-	3	1	-	2	1	-	(3)	1
Literacy	1	-	2	2	-	1	1	-	2
Infant mortality	1	2	-	2	1	-	1	(2)	-

	WORLD		NORTH		SOUTH	
	Calories	Proteins	Calories	Proteins	Calories	Proteins
Calories	-	1	-	1	-	1
Proteins	1	-	1	-	1	-

	WORLD			NORTH			SOUTH		
	Newsprint	Radios	Telephones	Newsprint	Radios	Telephones	Newsprint	Radios	Telephones
Newsprint	-	2	1	-	(2)	1	-	-	2
Radios	1	-	2	4	-	2	3	-	2
Telephones	3	2	-	1	2	-	1	2	-

	WORLD			NORTH			SOUTH		
	GDP p.c.	MVA p.c.	GFCF p.c.	GDP p.c.	MVA p.c.	GFCF p.c.	GDP p.c.	MVA p.c.	GFCF p.c.
GDP p.c.	-	5	1	-	-	1	-	(5)	1
MVA p.c.	1	-	-	1	-	-	2	-	-
GFCF p.c.	1	-	-	1	-	-	1	-	-

	WORLD			NORTH			SOUTH		
	Physicians	Nurses	Hospital beds	Physicians	Nurses	Hospital beds	Physicians	Nurses	Hospital beds
Physicians	-	-	-	-	(3)	(6)	-	-	-
Nurses	-	-	1	-	-	1	-	-	(6)
Hospital beds	-	1	-	(5)	(2)	-	-	(6)	-

	WORLD		NORTH		SOUTH	
	Primary education	Secondary education	Primary education	Secondary education	Primary education	Secondary education
Primary education	-	(6)	-	-	-	2
Secondary education	(5)	-	-	-	2	-

Notes and Sources: See Appendix 1.

indicator, be it elementary or composite, should be used. Thus, socio-economic equations like those used in Wheeler (1980) which contain interconnected indicators loose - despite their intuitive appeal - much of their statistical content.

Links between the Social and the Economic System

One of the unexpected results of the stepwise regression analysis lies in the closeness of the indicators of the social and the economic system; the few instances where economic indicators achieved sufficient explanatory power for social variables are depicted in Table 5. As can be easily seen, the three economic result indicators - both at the global and at the North-South level - have, aside from communications, housing, and one health indicator (hospital beds), only a modest explanatory impact for social performance levels. This, in turn, leads directly to the question of which types of relations between the social and the economic system might prevail.

In the literature, strong evidence is available on the existence of mutual relationships. Thus, E.F. Denison, in his pioneering study on economic growth in the United States (Denison 1962), attributes roughly 23 per cent of America's economic growth between 1910 and 1960 to the effects of improvements in the educational system. And many commentators (e.g., Sheehan and Hopkins 1979) emphasize the significance of the level - and not the growth rate - of GNP per capita on the behaviour of social systems. On the other hand, both the intensity and the overall consequences of this interrelationship, remain largely a unresolved mystery.

From an economic point of view, Kuznets (1968), Adelman and Morris (1973), and Chenery and Syrquin (1975), among others, argue quite strongly that economic development per se has, due to growing distributional inequalities, even negative effects for the lower income strata of developing regions. Moreover, Adelman and Morris claim that, with respect to political participation, the economic system does not affect the performance of the political spheres directly but only via an intermediate instance, viz. the social system (Adelman-Morris 1973: 191). From a more strategy oriented standpoint, Morawetz (1977), and Hicks and Streeten (1979) also arrive at results indicating that the ties between economic and social indicators are weaker than normally assumed. To make matters worse, the opposite view is taken by McGranahan et al. (1981) who, not unlike Sheehan and Hopkins, stress

TABLE 5: RESULTS OF THE STEPWISE REGRESSION ANALYSIS II: LINKS BETWEEN ECONOMIC AND SOCIAL SYSTEMS

System Sub-System	Indicator	GDP p.c.			MVA p.c.			GFCF p.c.		
		World	North	South	World	North	South	World	North	South
Social System	Life expect.	-	-	-	-	-	-	-	4	-
	Literacy	-	4	-	4	-	-	-	-	-
	Infant mortality	-	-	-	-	-	-	-	-	-
Nutrition Sub-Syst.	Calories	-	-	-	-	4	-	-	-	3
	Proteins	-	-	-	-	-	-	-	-	-
Health Sub-Syst.	Physicians	-	-	-	-	-	-	-	-	-
	Nurses	-	-	-	-	-	3	-	-	-
	Hospital beds	6	-	-	2	-	-	6	1	-
Education Sub-Syst.	Primary	-	-	-	-	-	-	-	-	-
	Secondary	-	5	-	-	-	-	-	-	-
Communi-cation Sub-Syst.	Newspapers	-	4	-	2	2	1	-	-	-
	Radios	-	-	-	-	-	-	-	-	-
	Telephones	1	2	-	-	-	-	-	-	-
Housing Sub-Syst.	Safe Water	-	-	2	-	-	1	3	-	-

Notes and Sources: See Appendix 1.

the high significance of economic indicators for the explanation of social phenomena.

As a starting point, a correlation analysis for the six social and economic result indicators has been performed - see Table 6 - the outcome of which (except for literacy) deviates only slightly from Hicks and Streeten or Morawetz.[5/] While all results are significant, the intra-systemic correlations are much higher than those between social and economic variables, which provides another suggestion that the existing relations between the social and the economic system are notably weaker than the links within these systems.

TABLE 6. CORRELATION COEFFICIENTS FOR SIX SOCIAL AND ECONOMIC INDICATORS

	Life expectancy	Literacy	Infant mortality	GDP per capita	MVA per capita	GFCF per capita
Life expectancy	1	0.907	-0.946	0.684	0.710	0.687
Literacy		1	-0.901	0.583	0.671	0.574
Infant mortality			1	-0.654	-0.695	-0.655
GDP per capita				1	0.882	0.968
MVA per capita					1	0.888
GFCF per capita						1

Notes and Sources: See Appendix 1.

In order to obtain more substantial insights into this question two types of F-tests have been carried out using variance analyses: the first one represents tests which determine the significance level of an independent variable added last to a linear regression equation; and the second applies the average for three types of criteria - the Hotelling-Lawley Trace, Pillai's Trace, and Wilk's Lambda [6/] - which assess, again via F-approximations, the relative impact of a specific independent variable on a set of dependent variables. For the purpose of the present analysis, two regional classification variables have been introduced - the one variable consisting of the two regions North and South and the other of the twelve world regions

outlined in Figure 1. Furthermore, functions of the type

$$I_i = aC_j + bI_k \text{ with } i,k,j = 1,2 \text{ and } i \neq k$$

where I_i, I_k denote either an economic or a social indicator and C_j one of the regional classification variables, have been used as a basis for the first type of F-tests which determine the explanatory impact of the second independent variable after adjustments have been made for the effects of the first independent variable. This investigation was directed at two specific questions:

- whether the social variance accounted for by economic variables attained the scale which conventional development theory normally takes as given; and
- whether regional effects yielded similar results for both the economic and the social spheres.

Three basic results (which can be seen in Tables 7 and 8) emerged from the variance analysis.

The outcomes for North-South disaggregations on Table 7 show that the economic variables are, with large proportions of unexplained variance, almost universally significant at the 1 per cent level in their impact on social result indicators. At the level of twelve geographical regions almost the same results have been obtained, the only difference being that, for obvious reasons, the F-values for the regional variables become somewhat reduced.

Performing the same analysis with social result indicators as independent variables produced, quite naturally, similar results. (See Table 8.) More important, however, are the outcomes in the last part of Table 8 (labeled 'effects') in which multivariate tests for the effects of each of the three social indicators taken individually on the three indicators of the economic system taken collectively are recorded. The average for the three criteria applied in the table are all based on the joint distribution of the three dependent economic indicators, which makes it highly remarkable that for life expectancy and, to a lesser extent, for infant mortality, significant effects on the economic sphere can be identified. Thus, this outcome also supports hypotheses concerning the significance of the impact of the social system on the economic system; but, again, there remains a very high amounts of

TABLE 7:

RESULTS OF THE VARIANCE ANALYSIS I: EFFECTS OF THE ECONOMIC ON THE SOCIAL SYSTEM

			WORLD	NORTH	SOUTH
Life Expectancy	North-South	F:	1615.09**		
	GDP p.c.	F:	17.95**		
	North-South	F:	1699.83**		
	MVA p.c.	F:	15.20**		
	North-South	F:	1448.72**		
	GFCF p.c.	F:	17.76**		
	Region	F:	634.56**	6259.01**	424.12**
	GDP p.c.	F:	10.17**	13.47**	16.86**
	Region	F:	748.68**	4005.17**	362.69**
	MVA p.c.	F:	5.40*	2.02	23.53**
	Region	F:	646.57**	2742.08**	397.08**
	GFCF p.c.	F:	7.63**	0.03	3.88
Literacy	North-South	F:	171.97**		
	GCP p.c.	F:	5.08*		
	North-South	F:	182.99**		
	MVA p.c.	F:	10.28**		
	North-South	F:	142.50**		
	GFCF p.c.	F:	5.18*		
	Region	F:	62.05**	424.52**	39.92**
	GDP p.c.	F:	2.99	11.03**	2.37
	Region	F:	72.72**	291.95**	29.25**
	MVA p.c.	F:	3.31	1.84	10.66**
	Region	F:	61.20**	210.05**	41.74**
	GFCF p.c,	F:	2.15	0.53	0.85
Infant Mortality	North-South	F:	250.96**		
	GDP p.c.	F:	13.80**		
	North-South	F:	247.78**		
	MVA p.c.	F:	13.60**		
	North-South	F:	239.37**		
	GFCF p.c.	F:	13.22**		
	Region	F:	82.51**	27.88**	62.59**
	GDP p.c.	F:	7.77**	16.19**	10.61**
	Region	F:	88.56**	13.25**	64.70**
	MVA p.c.	F:	4.62*	3.75	16.75**
	Region	F:	90.60**	2.11	61.51**
	GFCF p.c.	F:	5.53*	0.42	2.94
			C I	C I	C I
Effects	North-South	F:	1761.82**		
	GDP p.c.	F:	7.96**		
	Region	F:	326.77**	1385.40**	299.17**
	GDP p.c.	F:	3.64*	8.20**	8.04**
	North-South	F:	1772.18**		
	MVA p.c.	F:	5.06**		
	Region	F:	370.53**	1036.03**	254.91**
	MVA p.c.	F:	1.86	1.77	7.68**
	North-South	F:	1549.40**		
	GFCF p.c.	F:	7.76**		
	Region	F:	347.43**	1830.24**	322.15**
	GFCF p.c.	F:	2.72*	0.39	1.59

** Significant at the 1% level.
* Significant at the 5% level.

TABLE 8: RESULTS OF THE VARIANCE ANALYSIS II: EFFECTS OF THE SOCIAL ON THE ECONOMIC SYSTEM

			WORLD	NORTH	SOUTH
GDP per capita	North-South	F:	67.99**		
	Life Expectancy	F:	17.77**		
	North-South	F:	39.80**		
	Literacy	F:	5.15*		
	North-South	F:	159.66		
	Infant Mortality	F:	13.25**		
	Region	F:	14.67**	3.53**	2.40*
	Life Expectancy	F:	9.54**	13.21**	14.71**
	Region	F:	10.94**	3.81	1.00
	Literacy	F:	2.62	9.35**	1.60
	Region	F:	33.04**	21.91**	5.38**
	Infant Mortality	F:	6.94**	11.19**	9.12**
MVA per capita	North-South	F:	133.63**		
	Life Expectancy	F:	15.29**		
	North-South	F:	90.36**		
	Literacy	F:	10.16**		
	North-South	F:	249.83**		
	Infant Mortality	F:	12.75**		
	Region	F:	22.68**	0.46	4.83**
	Life Expectancy	F:	5.80*	2.07	25.30**
	Region	F:	17.43**	0.13	1.48
	Literacy	F	3.27	1.20	10.66**
	Region	F:	42.62**	7.16**	11.08**
	Infant Mortality	F:	4.33*	1.52	18.20**
GFCF per capita	North-South	F:	57.90**		
	Life Expectancy	F:	17.68**		
	North-South	F:	33.00**		
	Literacy	F:	4.79*		
	North-South	F:	141.43**		
	Infant Mortality	F:	13.16**		
	Region	F:	12.45**	0.09	1.60
	Life Expectancy	F:	7.17**	0.03	3.77
	Region	F:	9.49**	0.52	1.56
	Literacy	F:	1.80	0.53	0.61
	Region	F:	29.15**	4.00*	4.31**
	Infant Mortality	F:	5.11*	0.42	2.88
			C I	C I	C I
Effects	North-South		31.56**		
	Life Expectancy		6.57**		
	Region		7.58**	1.32	2.45**
	Life Expectancy		3.21*	5.77**	12.34**
	North-South		23.36**		
	Literacy		3.32*		
	Region		6.90**	2.71*	1.36
	Literacy		1.24	16.37**	5.35**
	North South		53.93**		
	Infant Mortality		5.08**		
	Region		11.40**	6.36**	3.90**
	Infant Mortality		2.36	22.11**	8.12**

unexplained variance. 7/ In neither of the two sets of results is there clear evidence to support the hypothesis that, irrespective of the relative closeness of socio-economic systems in general, one of the two systems dominates the other.

The most revealing discrepancy between Table 7 and 8 lies in the differing effects of regional variables for the social and for the economic system: while regional variables are apparently of utmost importance for the explanation of the social system taken as a whole, they become, at various instances, even insignificant for the economic sphere. (See the last sections of each table.) This result not only suggests a greater homogeneity of social systems within the different regions but also questions whether the regional classification schemes used for the present study offer the most adequate partitioning for analyzing global socio-economic development. It might well be that alternative classifications like the one envisioned by Wallerstein et al. (Wallerstein 1979, Bergesen 1980, ISSJ 1982) or that used in UNIDO (1979) and UNIDO (1982a) present more appropriate ways to conceptualize the regional distribution of socio-economic systems on the global scale.

Although the methodological aspects of the indicators used to measure the development of the social system are discussed elsewhere - e.g., UNRISD 1977, Wiedemann 1981, UNIDO 1982 - the weaknesses of the existing social accounting data relative to traditional national accounts data must always be born in mind when evaluating conclusions of studies which employ social indicators. Thus, there is a general absence of adequate and appropriate data on the distributional and access characteristics of social development, the available data being only national averages with no regard for those falling below the averages. As for the existing data, they are sometimes statistically or definitionally weak, provide inadequate coverage, are redundant, non-monotonic, or inappropriate either for measuring development in the poorest countries or in the most developed (or both simultaneously). But such are also the data upon which policy discussions are held and policy decisions made.

PART II: SOCIO-ECONOMIC DEVELOPMENT, 1960-1980

The second part of this paper focuses on some essential trends in the overall industrialization process over the past two development decades. The analysis will concentrate on a sample of fifty-four countries [8/] which have been selected with the stipulation that both North and South be represented proportionally and that data be comparable, reliable, and complete in the five socio-economic result indicators life expectancy, literacy, infant mortality, GDP per capita, and MVA per capita. The scope and the spatial dimensions of the second part of the investigation can therefore be depicted as on Figure 4. Two main groups of results, the one descriptive and the other one theoretical in nature, were obtained from the sample analysis.

THE DIMENSIONS OF SOCIO-ECONOMIC DEVELOPMENT, 1960-1980

A brief survey of the changing development differentials during the period under investigation brings to light three important processes, which can be detected from a graphical representation of the development gains recorded during 1960 to 1980 on Figure 5, from a summary of the results of the sample analysis on Table 9, and from a summary presentation of the same types of outcomes for two groups within the South - for Latin America, South-East Asia, and North Africa and the Middle East on the one hand, and South Asia and Sub-Saharan Africa on the other hand - on Table 10.

Limits to social growth in the North

From these data one can clearly observe that, with the exception of infant mortality, only modest gains in the social fields of the developed regions have been achieved over the two decades. While it is arguable whether literacy and infant mortality can be considered as appropriate social result indicators (McGranahan et al. 1972), the same objections cannot be raised against life expectancy. Thus, two important propositions can be put forward:

- The northern social system as a whole approaches asymptotically several limits (Figure 5, Table 9), though it remains unclear at the present stage of investigation whether these limits are due to biological and environmental constraints or to distributional bottlenecks (Thurow 1979, Hirsch 1980).

FIGURE 4: SCOPE AND SPATIAL DIMENSIONS OF THE INTERTEMPORAL ANALYSIS.

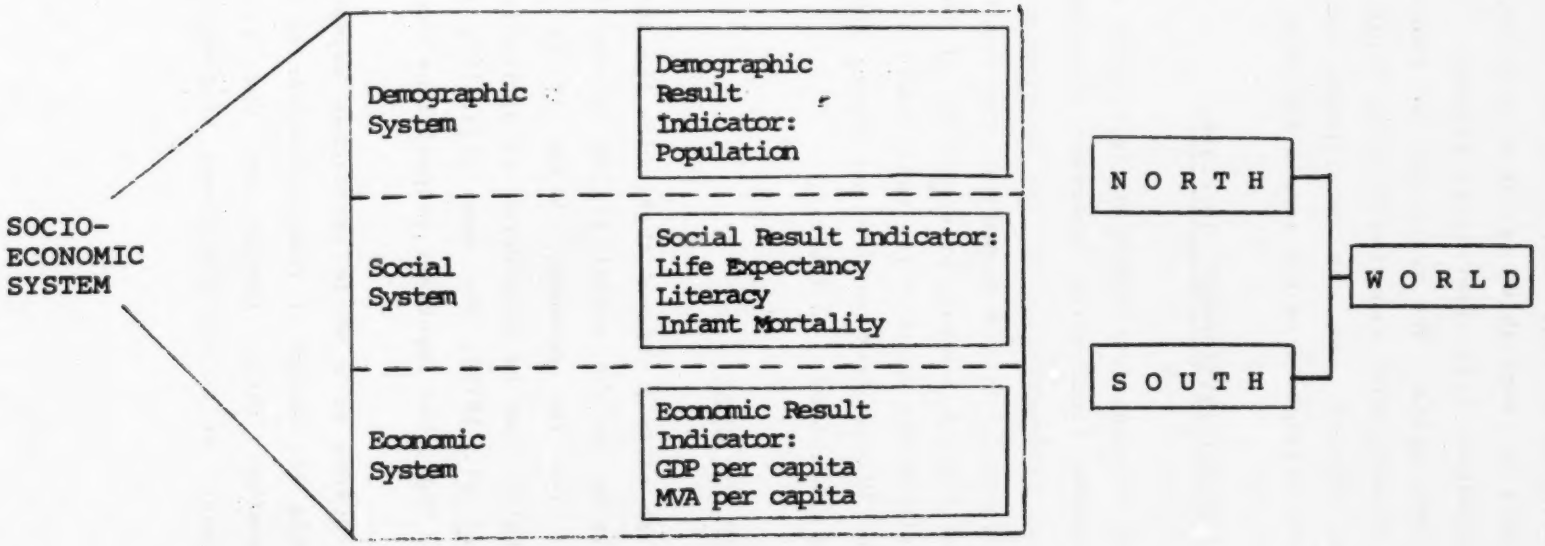
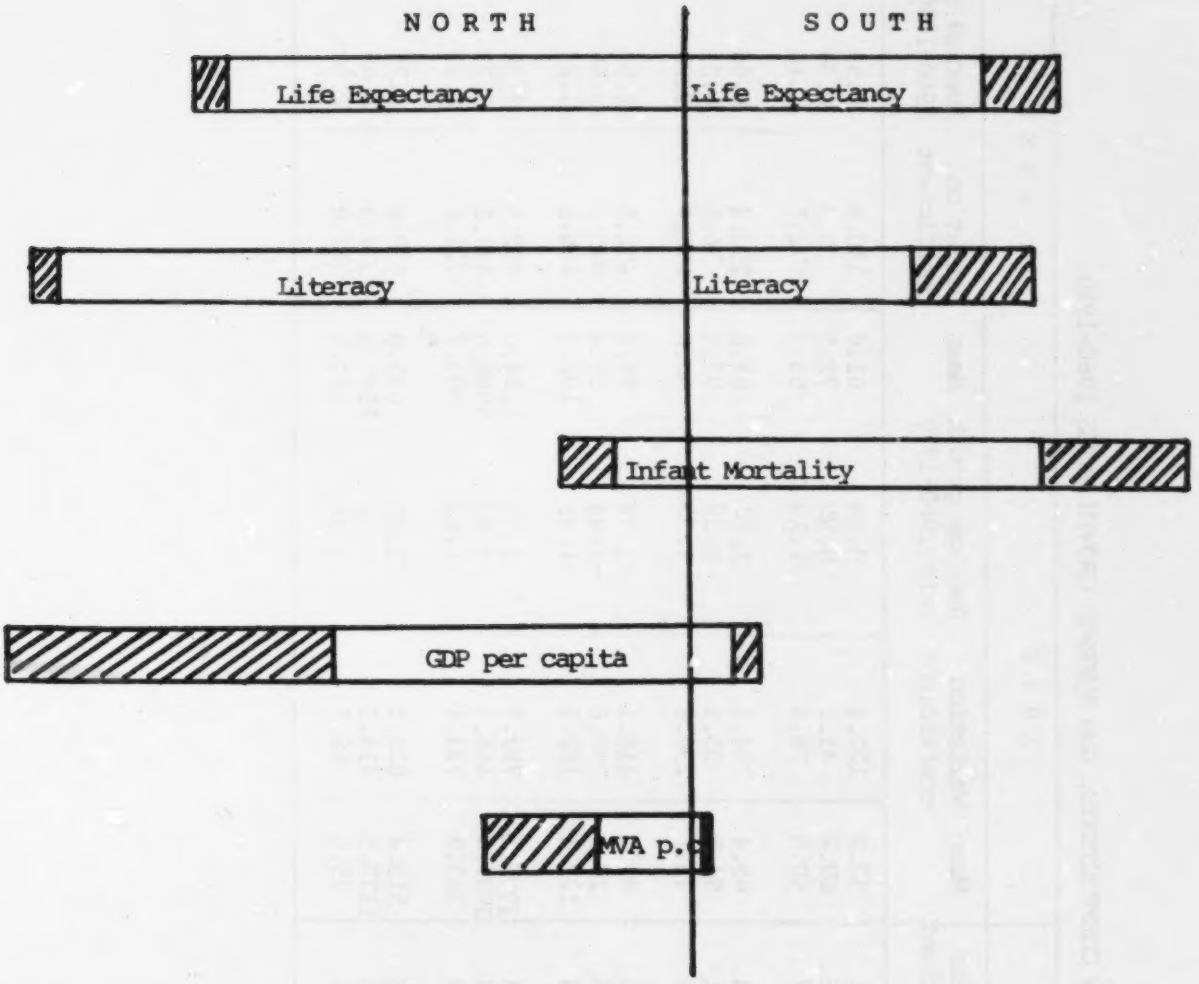


FIGURE 5: CHANGES IN SOCIO-ECONOMIC DEVELOPMENT DIFFERENTIALS, 1960-1980.



Level in 1960

Absolute increase over 1960-1980
(for infant mortality: absolute decrease)

Notes and Sources: See Appendix 1.

TABLE 9: WEIGHTED AVERAGES, VARIATION COEFFICIENTS, AND AVERAGE GROWTH RATES 1960-1980.

		1960		1970			1980			
		Mean	Variation coefficient	Mean	Variation coefficient	Average growth rate 1960-1970	Mean	Variation coefficient	Average growth rate 1960-1980	Average growth rate 1970-1980
Life expectancy	World	54.6	147.1	57.9	120.4	0.59	61.4	110.8	0.59	0.59
	North	67.8	44.6	69.8	41.1	0.29	72.5	35.3	0.34	0.38
	South	44.4	112.7	50.0	78.4	1.19	55.3	72.5	1.10	1.01
Literacy	World	59.1	355.4	65.4	284.1	1.01	67.5	293.4	0.66	0.32
	North	93.4	94.1	94.8	80.1	0.15	97.3	76.6	0.21	0.26
	South	32.7	403.5	45.7	290.6	3.33	50.8	270.7	2.20	1.08
Infant mortality	World	100.4	408.6	84.4	410.1	-1.74	74.4	452.5	-1.50	-1.26
	North	38.1	636.8	27.0	793.6	-3.44	22.4	943.6	-2.66	-1.87
	South	148.4	187.4	122.1	162.5	-1.95	102.9	195.5	-1.83	-1.71
GDP per capita	World	1346.0	713.4	1773.0	799.5	2.75	2124.0	892.3	2.28	1.82
	North	2652.0	535.4	3889.0	466.5	3.83	5060.0	441.1	3.23	2.63
	South	319.9	554.9	383.9	784.1	1.82	500.2	721.6	2.23	2.65
MVA per capita	World	448.7	525.8	513.4	822.2	1.35	635.0	872.6	1.74	2.13
	North	698.4	533.3	1173.5	414.2	5.19	1567.2	314.4	4.04	2.89
	South	48.5	816.8	75.9	768.7	4.48	114.5	911.9	4.30	4.11

Notes and Sources: See Appendix 1.

TABLE 10: MEANS, VARIATION COEFFICIENTS AND GROWTH RATES FOR GROUP I AND GROUP II COUNTRIES FOR SOCIAL AND ECONOMIC INDICATORS

		1960		1970			1980				Absolute Difference between	
		Mean	Variation cofficient	Mean	Variation coefficient	Average growth rate 1960-1970	Mean	Variation coefficient	Average growth rate 1960-1980	1970-1980	North & Group II	Group I & Group II
Life expectancy	Group I	48.0	63.2	54.3	58.0	1.23	60.3	49.2	1.14	1.05	-7.6	-
	Group II	41.3	33.6	46.5	34.8	1.19	51.1	46.5	1.06	0.94	-5.1	+2.5
Literacy	Group I	52.1	149.7	64.1	121.7	2.07	72.5	100.9	1.65	1.23	-16.5	-
	Group II	23.6	234.5	32.3	231.4	3.14	35.9	241.1	2.10	1.06	-8.4	+8.1
Infant mortality	Group I	123.2	147.3	97.6	169.0	-2.33	73.4	176.3	-2.59	-2.85	-34.1	-
	Group II	142.2	64.0	138.7	51.1	-0.25	125.4	89.4	-0.63	-1.01	-1.1	+33.0
GDP per capita	Group I	497.0	349.7	685.9	395.6	3.22	926.8	354.5	3.12	3.01	+1978.2	-
	Group II	128.6	223.2	146.2	264.0	1.28	163.9	327.7	1.21	1.14	+2372.7	+394.5
MVA per capita	Group I	89.6	472.1	141.1	518.9	4.54	218.0	467.8	4.45	4.35	+740.4	-
	Group II	16.1	188.5	21.8	282.7	3.03	27.9	383.9	2.75	2.47	+857.0	+116.6

Specific Note: Group I = Latin America, South-East Asia, North Africa and the Middle East.
Group II= South Asia and Sub-Saharan Africa.

Notes and Sources: See Appendix 1.

- This occured at the same time that social input indicators for the North had in all probability, recorded considerable gains, suggesting that their marginal rate of return, evaluated in terms of life expectancy, would have been close to zero. This conclusion, must, however, be subject to the above-mentioned caveat that social indicators very imperfectly reflect qualitative, distributional, and access characteristics of the social system in question.

Rapid social changes in the South

On the other hand, the rates of social growth recorded in the southern hemisphere during the past two development decades have been remarkable. More specifically, two different social processes can be identified for the South within the 1960 to 1980 period:

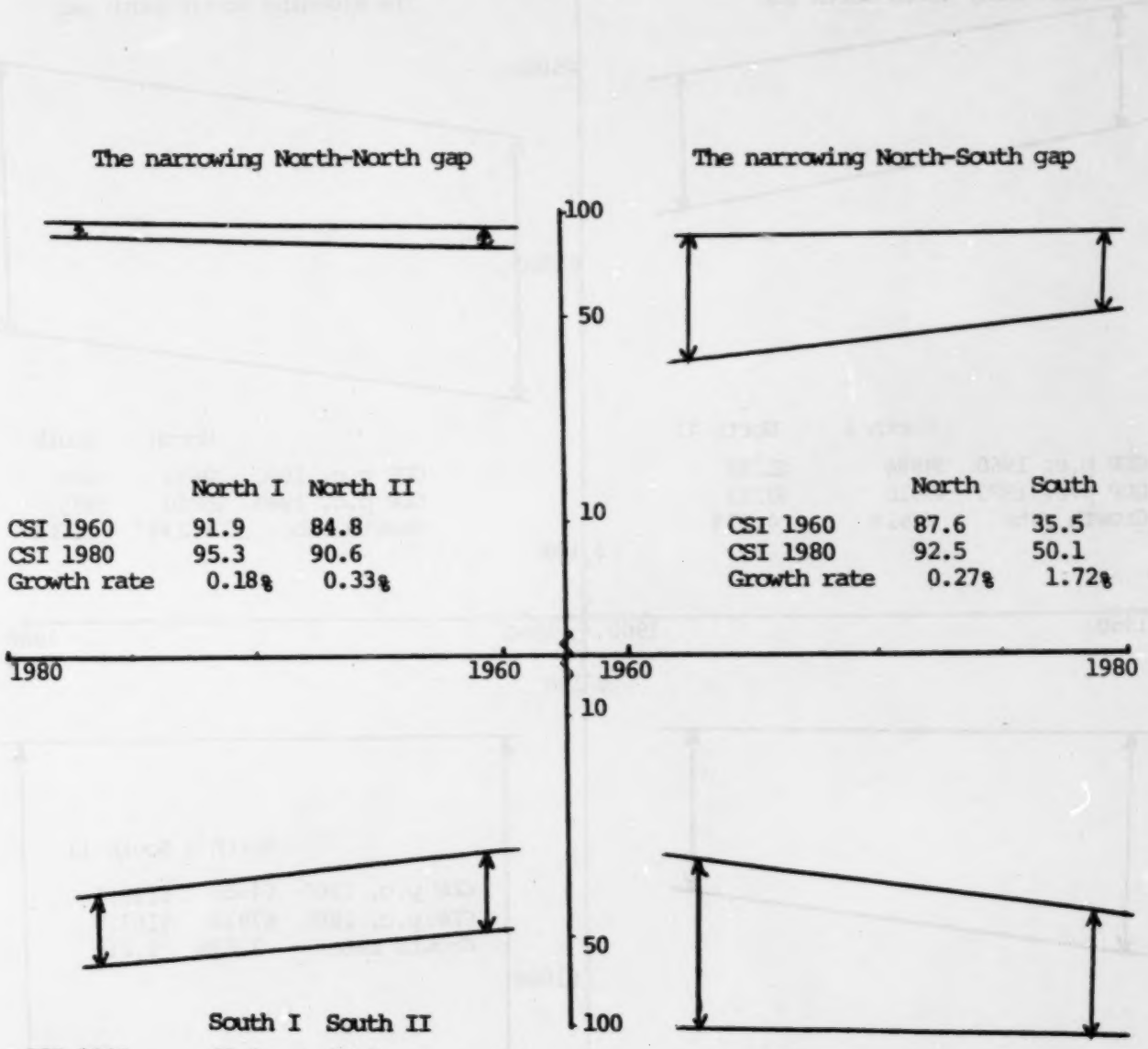
- The closing North-South gap: The global social development gap narrowed over the two decades and the social world in 1980, judged from the performance in the three result indicators, became more homogeneous than it had been in 1960. (Figure 6) This point can be further substantiated by the considerable decreases in the variation coefficients for the three social result indicators. (Table 9)

- The persisting South-South gap: These rapid social increases, however, did not bring about a parallel reduction in the absolute discrepancies within the South, e.g. between Latin America, South-East Asia, and North Africa and the Middle East (Group I) on the one hand, and South Asia and Sub-Saharan Africa (Group II) on the other hand. And this is true even though the rates of social growth were appreciably higher in the second group than in the first one. (Table 10)

The widening economic differentials

One of the main findings of the present study lies in the clear result that, while social development became more evenly distributed over the two decades, economic growth in the North and in the South did not demonstrate any tendencies towards equalization. In respect to the pattern of convergence shown on Figure 6, it is however clear that in many cases this convergence is

FIGURE 6 : GAPS IN SOCIAL DEVELOPMENT, 1960-1980

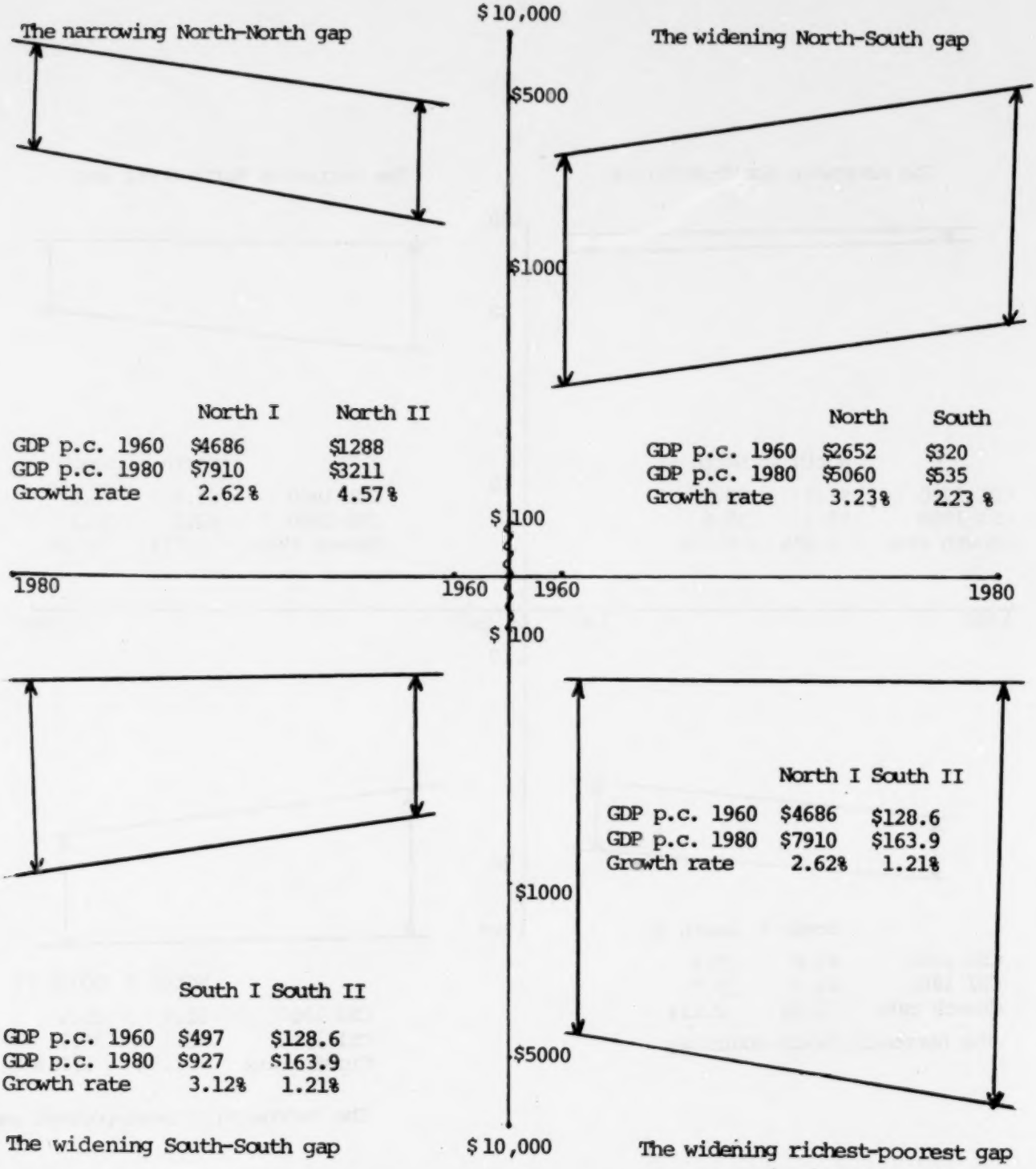


Specific Notes: CSI is a 'combined social indicator', defined as population weighted averages of literacy and life expectancy: $CSI_i = \left(\frac{LIFE + LIT}{2}\right) \cdot w_i$ (both indicators standardized from 0 to 100)

For the definition of North I etc., see Figure 6.

Other Notes and Sources: See Appendix 1.

FIGURE 7: GAPS IN ECONOMIC DEVELOPMENT, 1960-1980



Specific Note: GDP is measured in constant 1975 dollars and growth rates are average annual compound growth rates. North I is composed of the six richest northern sample countries in 1960, measured in GDP per capita, and North II consists of the seven remaining northern sample states. For South I and South II see text.

Other Notes and Sources: See Appendix 1.

more apparent than real, since the phenomenon may also be the result of the upper limits mentioned above rather than more fundamental forces of social development. Figure 7 makes it unmistakably clear that:

- between 1960 and 1980 the global economic North-South gap widened, thus supporting Kuznets' hypothesis of a long-term trend of increasing economic discrepancies (Kuznets 1972);

- the absolute differences, measured in average GDP per capita figures for the richest and poorest regions of the world, increased from a ratio of 36:1 in 1960 to 48:1 in 1980;

- the economic differentials (measured in GDP per capita) within the South, using the same division into two groups as above, expanded in a similar fashion from 4:1 in 1960 to 6:1 in 1980; and

- the economic discrepancies within the northern regions subsided considerably in relative, though not absolute, terms.

Six stylised facts on socio-economic relations

The above results are remarkable because they confirm, from an intertemporal point of view, the conclusion from the 1980 review that the relations between the social and the economic spheres are weaker than customarily assumed. Additionally, they give rise to a series of 'stylised facts' (Kaldor 1961) on the long-term evolution of the social and the economic system in the global context:

First, at the lower end of economic development, a rich variety of social systems exists simultaneously reflecting, on the one hand, the state of development prior to and during the incorporation into the worldwide industrialization process, and, on the other hand, the different political systems which prevail in these regions. [9/]. Secondly, at medium [10/] levels of economic development, the variation in social standards is reduced since, though no upper limits to social performance levels are present, lower limits appear: medium-level economic development apparently requires certain minima in social dimensions like literacy and health care for its successful

functioning and continuation. Thirdly, when the state of economic development surpasses the $3000 GDP per capita level, both upper and lower limits appear and the social system, measured by its result indicators is subject to decreasing marginal returns (with the caveat on indicator quality given earlier).

Fourthly, due to these upper and lower limits, the global social system shows, at least in the long-run, a marked tendency towards equalization. Fifthly, no upper limits can be identified for the economic sphere, which would imply that, unless exogeneous constraints from the environment or endogeneous equalization processes via trade mechanisms are present, economic progress in the future could be accompanied by even greater distributional inequalities. Finally, assuming that the socio-economic world at the outset of the Industrial Revolution was far more homogeneous than in the two centuries following it (Myrdal 1971, Bairoch-Levy-Leboyer 1981), it is possible to argue that the global social system has already surpassed the point of maximum social difference between least and most developed regions, while the opposite result would hold true in the global economic sphere.

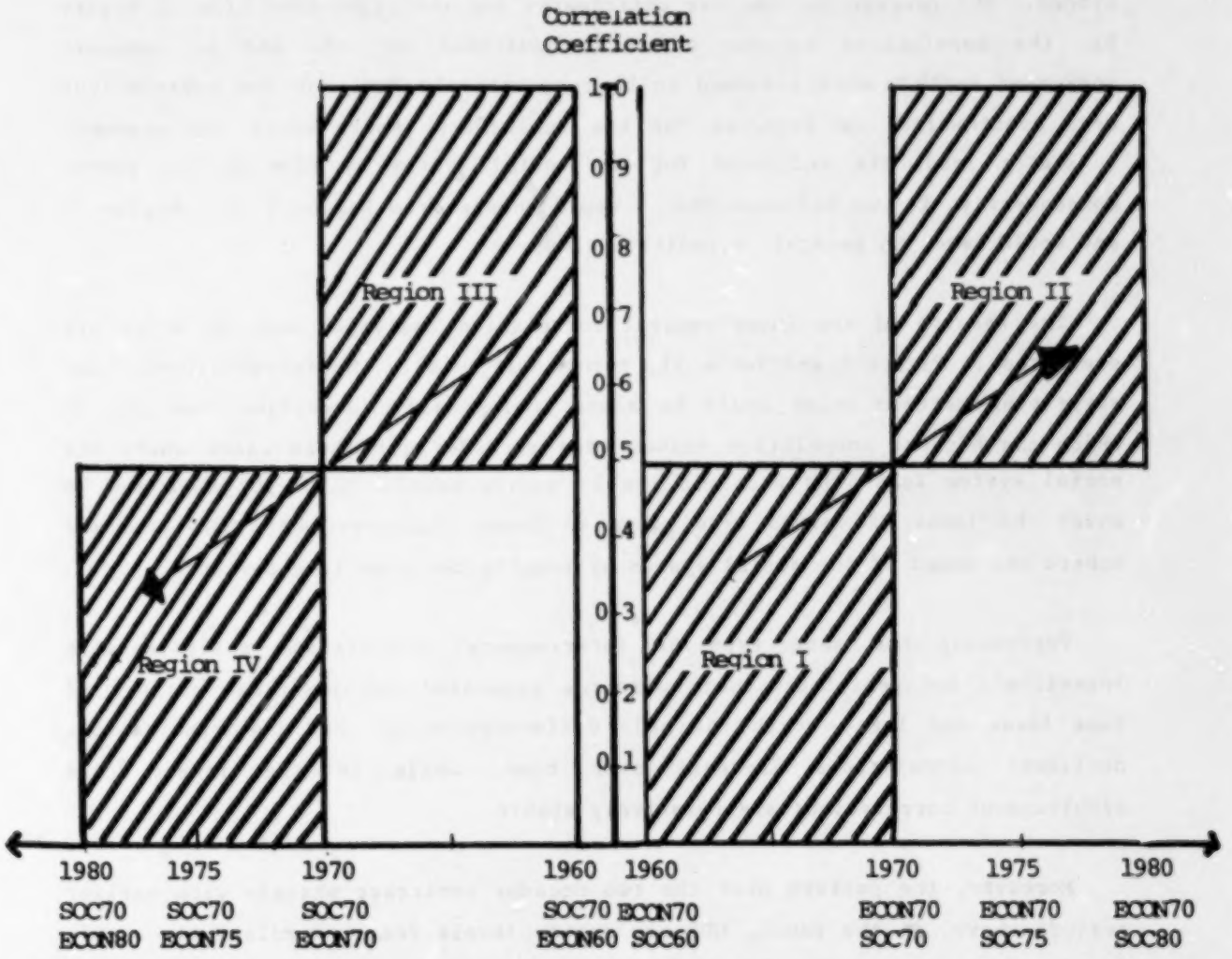
THE INTERTEMPORAL RELATIONSHIP BETWEEN SOCIAL AND ECONOMIC DEVELOPMENT

While the last three 'facts' make it clear that social and economic development have followed along diverging paths in recent history, the first three 'facts' still suggest, though with some provisos, that economic development - over time - creates its suitable social environment. The final step of the present investigation therefore addresses the problem of time lags inherent in the overall industrialization process. Due to severe data limitations - only four observations for social result indicators (1960, 1970, 1975 and 1980) were available - the usual time series techniques (Anderson 1970, Dhrymes 1976) could not be applied, and correlation and variance analysis are thus used to cast some tentative light on the existing intertemporal relations between social and economic spheres.

The Intertemporal Correlation Analysis

The intertemporal correlation study can best be characterized by Figure 8, where, on the left hand side, a social indicator for the year 1970 is correlated with one of the two economic result indicators (GDP per capita and MVA per capita) for 1960, 1970, 1975, 1980. The a priori expectation, in

FIGURE 8: TEST DESIGN FOR THE INTERTEMPORAL CORRELATION ANALYSIS



accordance with normal development theory, was that the correlation coefficients will be higher in those cases where the economic system leads the social system by some years and will fall the longer the indicator for the economic system lags behind the indicator for the social sphere. Thus, the correlation coefficients were expected to decrease as they move from Region III to Region IV, and the correlation coefficient was assumed to be negatively sloped. The reverse outcome was anticipated for the right-hand side of Figure 8: the corelations between a social indicator in 1960 and an economic indicator in 1970 were presumed to be comparatively low, and the correlations were hypothesized to increase for the subsequent phases where the economic indicator leads the indicator for the social system by five or ten years. Consequently, it was believed that R would change from Region I into Region II and would have, in general, a positive slope.

The results of the intertemporal correlation analysis, some of which are presented in Figure 9 and Table 11, turned out totally counter-intuitive: the surprising pattern which could be almost universally identified, was one in which the highest correlation values were recorded for those cases where the social system leads the economic one by approximately 15 to 20 years and in which the lowest R values were given to those instances where the economic sphere was ahead of the social system by roughly the same time period.

Performing the same type of intertemporal correlation analysis with logarithmic and semi-logarithmic versions generated the identical pattern of time leads and lags - with the only difference being that the simultaneous nonlinear correlations increase over time, while in the linear case simultaneous correlations are relatively stable.

Moreover, the pattern over the two decades contrasts sharply with earlier periods where, in the South, GDP per capita levels remained relatively stable in the face of very diverse standards of social development (Bairoch 1977) and, in the North, GDP growth rates were appreciably lower (Pollard 1981) (and social growth rates correspondingly higher). Given the divergence which has already been seen to characterize social and economic development over 1960 and 1980, this suggests that the global relationships between the social and economic spheres are following more and more a nonlinear arrangement.

To conclude this section on intertemporal correlations, a final remark on the validity of the above results must be added: though all sorts of

FIGURE 9: FIVE INTERTEMPORAL CORRELATION PATHS.

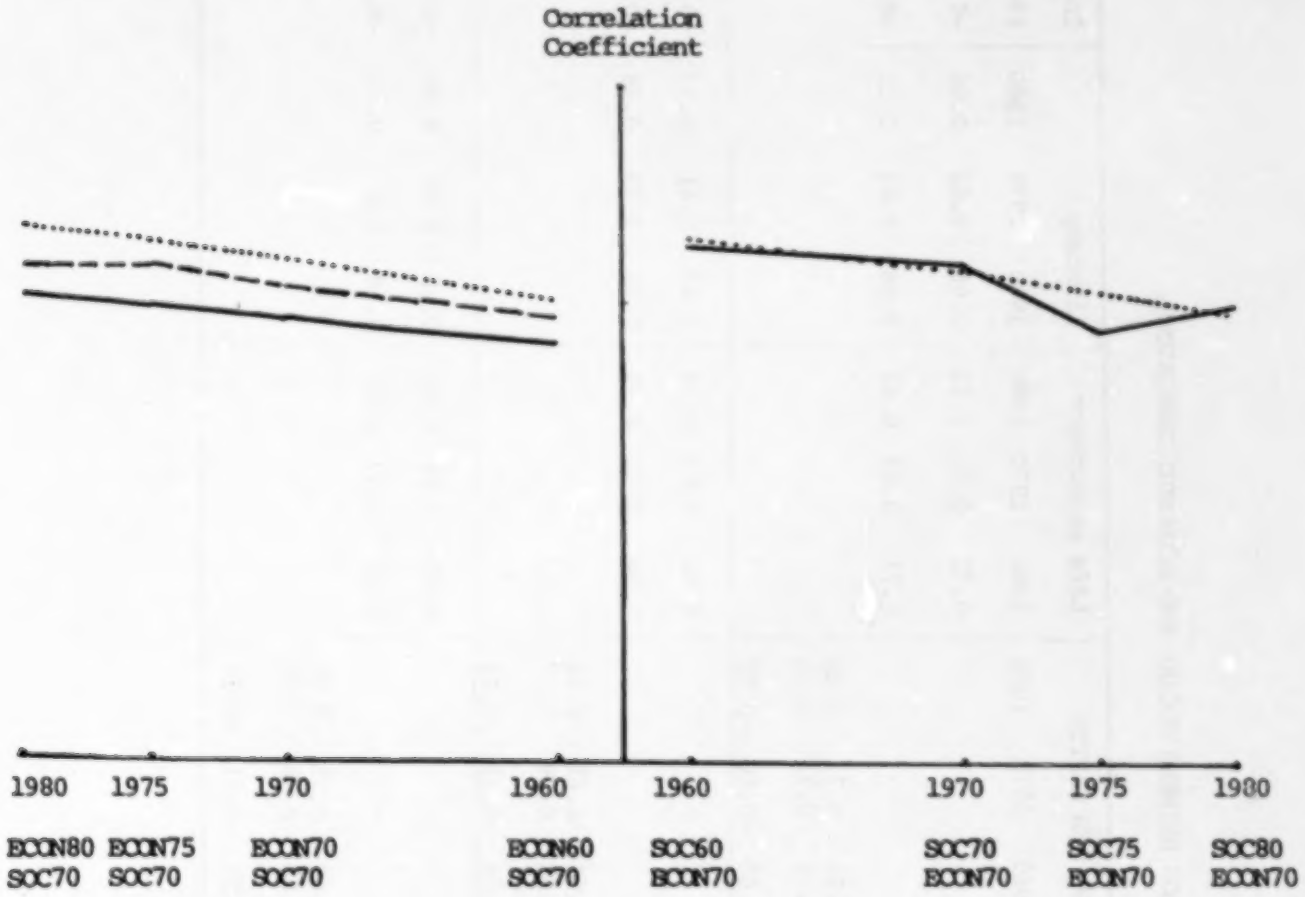


TABLE 11: CORRELATION COEFFICIENTS FOR TIME LAGS BETWEEN SOCIAL AND ECONOMIC INDICATORS.

		GDP per capita			MVA PER CAPITA			Life expectancy			Literacy			Infant mortality		
		1960	1970	1980	1960	1970	1980	1960	1970	1980	1960	1970	1980	1960	1970	1980
WORLD	GDP per capita (1960)							0.72	0.69	0.63	0.66	0.62	0.56	-0.67	-0.65	-0.62
	MVA per capita (1960)							0.71	0.67	0.61	0.66	0.61	0.55	-0.65	-0.63	-0.60
	Life expectancy (1960)	0.72	0.76	0.80	0.71	0.77	0.82									
	Literacy (1960)	0.66	0.69	0.71	0.66	0.71	0.75									
	Infant mortality (1960)	-0.67	-0.70	-0.72	-0.65	-0.70	-0.72									
NORTH	GDP per capita (1960)							0.54	0.52	0.58	0.47	0.41	0.37	-0.58	-0.53	-0.50
	MVA per capita (1960)							0.54	0.51	0.55	0.52	0.43	0.39	-0.55	-0.51	-0.50
	Life expectancy (1960)	0.54	0.59	0.60	0.54	0.60	0.64									
	Literacy (1960)	0.47	0.54	0.57	0.52	0.59	0.67									
	Infant mortality (1960)	-0.58	-0.63	-0.63	-0.56	-0.61	-0.63									
SOUTH	GDP per capita (1960)							0.63	0.64	0.55	0.50	0.50	0.46	-0.54	-0.54	-0.52
	MVA per capita (1960)							0.69	0.67	0.57	0.58	0.55	0.50	-0.53	-0.55	-0.51
	Life expectancy (1960)	0.63	0.69	0.82	0.69	0.75	0.78									
	Literacy (1960)	0.50	0.52	0.56	0.58	0.58	0.55									
	Infant mortality (1960)	-0.54	-0.59	-0.65	-0.53	-0.61	-0.60									

Notes and Sources: See Appendix 1.

fallacies are normally associated with correlation analyses (Simon 1977), it is, more than anything else, the conformity of these outcomes which, in the present context points in the direction of time leads of the social system.

The Intertemporal Variance Analysis

To corroborate the finding of an apparent time lag of the economic system vis à vis the social system, an intertemporal variance analysis has been applied though, in contrast to the variance analysis in the first part of the paper, the test design in the intertempral case was arranged in a somewhat different way: By using equations of the form

$$I_{i,80} = aC + bI_{j,80} + cI_{j,60} \quad \text{with } i,j = 1,2 \text{ and } i \neq j,$$

where $I_{i,80}$ and $I_{j,80}$ represent an economic or social indicator for 1980, $I_{j,60}$ denotes a social or economic indicator for 1960, and C the regional classification variable for the North and the South, it was hoped that, after adjusting for the regional and the simultaneous effects, the relative impact of time leads would become transparent. The results from this analysis are presented in Table 12, and require little additional interpretation, since they are characterized by a clear asymmetry: leading economic indicators bear, compared to their simultaneous counterparts, no extra information for the explanation of the social system while simultaneous social indicators, when compared with their leading counterparts, have no additional explanatory impact for the economic sphere.

It cannot be overemphasized that from a methodological, and even more from a theoretical point of view the results of the whole investigation which was limited to a set of unstructured result and input indicators are still weakly confirmed. Neither various types of statistical techniques nor the scope and the spatial dimensions of the study allow for well-established generalizations. But it is the striking similarity in these outcomes, pointing to the closeness of socio-economic systems in general and to the existence of social time leads wich have to be further investigated with more data and, where applicable, with a more elaborated statiscical and theoretical apparatus. 11/

TABLE 12: RESULTS OF THE INTERTEMPORAL VARIANCE ANALYSIS

TIME LAG OF THE GLOBAL SOCIAL SYSTEM:						
Life expectancy 80	Significance	GDP p.c. 80	F:	8.90**	t:	2.98**
		GDP p.c. 60	F:	2.05	t:	-1.43
		MVA p.c. 80	F:	9.42**	t:	3.07**
		MVA p.c. 60	F:	1.38	t:	-1.18
Literacy 80	Significance	GDP p.c. 80	F:	3.47	t:	1.86
		GDP p.c. 60	F:	0.57	t:	-0.75
		MVA p.c. 80	F:	6.14*	t:	2.48*
		MVA p.c. 60	F:	0.94	t:	-0.97
Infant mortality 80	Significance	GDP p.c. 80	F:	9.33**	t:	-3.06**
		GDP p.c. 60	F:	1.80	t:	1.34
		MVA p.c. 80	F:	11.95**	t:	-3.46**
		MVA p.c. 60	F:	1.60	t:	1.27
				C I		
Effects		GDP p.c. 80	F:	3.48*		
		GDP p.c. 60	F:	0.83		
		MVA p.c. 80	F:	3.86*		
		MVA p.c. 60	F:	0.51		
TIME LAG OF THE GLOBAL ECONOMIC SYSTEM:						
GDP p.c. 80	Significance	Life expectancy 80	F:	0.17	t:	-0.42
		Life expectancy 60	F:	4.65*	t:	2.16*
		Literacy 80	F:	0.00	t:	-0.03
		Literacy 60	F:	2.38	t:	1.54
		Infant mortality 80	F:	1.08	t:	-1.04
		Infant mortality 60	F:	3.01	t:	-1.74
MVA p.c. 80	Significance	Life expectancy 80	F:	0.91	t:	-0.96
		Life expectancy 60	F:	7.76**	t:	2.78**
		Literacy 80	F:	0.00	t:	-0.04
		Literacy 60	F:	3.19	t:	1.79
		Infant mortality 80	F:	1.62	t:	-1.27
		Infant mortality 60	F:	2.44	t:	-1.56
				C I		
Effects		Life expectancy 80	F:	0.59	-	
		Life expectancy 60	F:	3.80*		
		Literacy 80	F:	0.00		
		Literacy 60	F:	1.57		
		Infant mortality 80	F:	0.79		
		Infant mortality 60	F:	1.53		

Notes: As Table 6.
Other Notes and Sources:
See Appendix Table 1.

CONCLUSIONS

Over the past decade the literature in development economics has given increasing attention to social and political aspects of the industrialization process, and has stressed the need to place more importance on interactions among these elements. Despite this renewed interest even the leading work in this field has tended to neglect three problems of vital concern.

First, inadequate attention has been devoted to the problem of time lags inherent in the overall development process. Since the present analysis suggests a time lag of the economic vis à vis the social system of approximately fifteen to twenty eyars, the need to study the leads and lags between various socio-economic systems becomes a matter of importance. A second area of unduly ignored problems has to do with the structural specification of the regression equations used in most of the analyses so far. Comparing linear models with nonlinear specifications yielded, at least for the three social result indicators, a marked superiority of the nonlinear estimates. (See Table 13) Thus, the discussion on the significance of GDP per capita as an explanatory variable for the social system has often been, more than anything else, a discussion on the linearity of socio-economic structures.

Finally, in these analyses the question of alternative patterns of regional classification remain underexplored. This is despite the fact that a homogeneous clustering of countries can be considered a necessary precondition for meaningful structural specifications, and that the lack of economic investigations which move beyond the conventional North-South dichotomy inhibits adequate insights into the overall industrialization process, particularly in the developing countries.[12/]

The present study has provided considerable evidence to suggest that no 'automatic linkages' between the economic, the industrial, and the social development prcess exist and that, from a policy oriented view, social improvements, though not independent of, definitely do not necessarily come as a by-product of economic evolution. This result contrasts rather sharply with the fundamental premises of development strategies which view social improvements as a time-delayed phenomenon, generated primarily by periods of sustained economic growth. Moreover, the diverging trajectories of the global social and economic system over the previous development decades seem to

TABLE 13: LINEAR AND NONLINEAR SPECIFICATIONS

		Linear Specification	Nonlinear Specifications		
		(1) Soc Ind = a+b(GDP p.c.)	(2) Soc Ind = $a(1-e^{b(\text{GDP p.c.})})$	(3) Soc Ind = $a\ (\text{GDP p.c.})^{b}$	(4) Soc Ind = $\frac{S}{(1+e^{b(a-\text{GDP p.c.})})}$
Life expectancy	Adjusted R^2	0.46	-	0.72	0.60
	Mean Square Error	70.9	70.2	-	-
Literacy	Adjusted R^2	0.33	-	0.46	0.50
	Mean Square Error	614.8	417.7	-	-
Infant Mortality	Adjusted R^2	0.67	-	0.72	0.62
	Mean Square Error	400.2	342.0	-	-

Notes and Sources: See Appendix 1.

confirm the assumption that achievements in social standards and the promotion of economic growth need not necessarily coincide (Radhakrishna 1979). This, again, reinforces one fundamental point: past attempts to forcibly accelerate the development process in the developing countries have been concentrated too much on purely economic growth and largely ignored its distributional aspects and the social environment in which this economic expansion took place.

Strategies towards an economic 'big push' have undoubtedly achieved much; but many opportunities have been foregone. The policies and strategies that have been carried out have neglected the fact that, particularly for countries where the majority of the inhabitants still lives in absolute poverty, the growth of output has to be linked to the basic and urgent needs of the indigenous population. As a result, not only has the broad mass of the people suffered by being condemned to languish in illiteracy and to a short and unhealthy life, but the industrialization efforts of the country itself have also experienced serious setbacks, due to the insufficient social 'infrastructure' and the resultant shortages of human talents and skills. Since raising the level of socio-economic welfare is the ultimate objective of international organizations such as UNIDO, their policies and strategies for long term industrialization in the developing countries should be conceived from a broader perspective in which considerably more attention must be given to the effects which improvements in nutrition, health, education, communication, and housing in the present might have on economic growth in the future. 13/

Footnotes

1/ See Mesarovic-Pestel 1974 and Acham 1983. Since systems are usually defined as triples, consisting of components, environment, and structure, the first six systems are to be qualified as the main components, and the seventh system as the environment of the overall socio-economic system. Due to the investigative character of the present analysis, no structural specification will be given at the outset. For the system theoretic approach see Berta-Ianffy 1968, Bunge 1979, Patzak 1982, and Wedde 1983.

2/ The variation coefficient is defined as: variation coefficient = (standard deviation/mean) x 100.

3/ Only the ranking from 1 to 6 has been recorded in Table 4, since, for obvious reasons, higher ranks are devoid of any empirical interpretation.

4/ In addition to the linear version of the stepwise regression analysis, a log-linear specification was used which yielded almost identical results.

5/ Unless otherwise stated, the coefficients given are R and not R^2.

6/ For more details see Rao 1973 and Pillai 1960. In most cases R^2 for the regression equations were in the range 0.95 - 0.99.

7/ It might well be that the inclusion of political variables would alter the present outcomes substantially, since a plausible chain of effects may run from the economic to the political and from here to the social system. See e.g., Widmaier 1974, Frey 1977, Frey-Pommerehne 1979.

8/ The countries selected for the sample are listed in Appendix III of this paper.

9/ Three remarks have to be added immediately: On the one hand, no easy generalizations are obtainable with respect to the outcomes which pre-industrial conditions and the incorporation into a world-wide industrialization process eventually generate (Morris 1981). Possible patterns include de-industrialization processes (Bagchi 1976) and subsequent dualism (Murdoch 1980, Bagchi 1982); massive internal restructuring and economic spurts like in the Japanese case (Hammitzsch 1975, Allen 1981);

colonization of uninhabited territory and rapid industrialization etc.

On the other hand, the stylized facts must not be interpreted as if they would constitute a historical sequence: the first three facts make reference only to the present global socio-economic system while the last three assertions point to processes in its recent history. The reason why no theory of stages (e.g., Rostow 1978) is assumed has to do with the following methodological difficulty: Any theory of stages necessarily implies at a certain point in time t_1 that the development path in the interval $t_{-n}t_1$ of some 'observed' regions will be similar to the future trajectory of some other regions in the interval t_1t_m (m is normally assumed to be smaller than n, due to 'advantages of backwardness', an increase in the speed of technological diffusion and the like). In other words: a theory of stages is as unreliable as any long-term prediction. And long-term predictions are extremely unreliable.

Although, as T. Wolfe rightly noted (Wolfe 1981), the development process cannot be adequately conceptualized by invoking a decision theoretic apparatus where policy makers, subject to various constraints, are confronted with a neatly defined set of alternatives, the crossnational variations for countries with similar development histories and different political systems at the present time are nevertheless substantial: social growth recorded in typical nonmarket-systems like China, Tanzania or Cuba stand in a marked contrast to the social development paths followed by India, Zaire or Bolivia. (Lindblom 1977).

10/ For a more comprehensive set of criteria on medium income countries based largely on Lewis' nation of 'balanced growth' (Lewis 1973) see Wiedemann-Müller (1984).

11/ The need for more elaborate instruments of analysis refers, even more so to the problems of development strategies like the basic needs approach - even though the present study also confirms many of its 'distinctive features' (Streeten 1977).

12/ Further, 'models' of the socio-economic development process have tended to give markedly inadequate treatment to the complex interaction of the economic and social system suggested by the above analysis, the appropriate analytical

framework clearly being one which allows for the explicit and simultaneous interaction of the various components of the development process. (See Wheeler 1980, Hopkins and Van Der Hoeven 1981.)

13/ This would suggest that future work on the social aspects of industrialization could appropriately focus on: (a) obtaining, at least for some socio-economic indicators, complete and reliable time series so that problems like the direction of causality (Desai 1981), cyclical swings etc. can be addressed to in more appropriate manner; (b) treating the question of the regional agregation in Socio-economic analyses; and (c) developing small models of the simultaneous interaction of the economic and the social systems.

APPENDIX 1

INDICATORS: DEFINITION AND SOURCES

LIFE EXPECTANCY:
- Definition: Expectation of life at birth is defined as the average number of years of life which remain for males and females of a specified age (in the present case, 0) if they were subjected in the future to the same mortality conditions as asumed to obtain in the present on the basis of data covering a recent period". (UNRISD 1977, 35.)
- Source: World Bank (1982).

LITERACY:
- Definition: "This indicator relates only to the ability to read and write in an elementary sense, without any requirement of school attendance". (UNRISD 1977, 75.)

- Source: World Bank (1983).

INFANT MORTALITY:
- Definition: "This indicator is defined as the number of deaths of infants less than one year old, per thousand live births for the same year". (UNRISD 1977, 31.)

- Source: World Bank (1982).

CALORIE SUPPLY:
- Definition: Calorie supply in calories per capita per day in 1980.

- Source: World Bank (1983).

PROTEIN SUPPLY:
- Definition: Protein supply in grams per capita per day in 1980.

- Source: FAO (1981).

PHYSICIANS:
- Definition: The number of physicians per 10,000 inhabitants in 1980 "includes all physicians who are graduated from a medical school and are active as private physicians or working in a public and private health establishments, administrations, laboratories, research, teaching, etc." (UNRISD 1977, 43.)

- Source: World Bank (1983).

NURSING PERSONAL:
- Definition: Number of personnel per 10,000 inhabitants in 1980.

- Source: World Bank (1983).

HOSPITAL BEDS:
- Definition: The number of hospital beds per 1000 inhabitants in 1980 includes the following categories of establishment: "general hospitals, specialized hospitals, homes for chronic sick, and

medical centres (e.g., dispensaries and infirmaries possessing some beds for the diagnosis, treatment or observation of patients". (UNRISD 1977, 43.)

- Note: For this indicator, the latest available data according to the UN Statistical Yearbook have been collected, and no 1980 data are available.

PRIMARY EDUCATION:
- Definition: Percentage share of the total population 6 - 11 enrolled at school in 1980.

- Source: World Bank (1983).

SECONDARY EDUCATION:
- Definition: Percentage share of the total population 12 - 17 enrolled at school in 1980.

- Source: World Bank (1983).

NEWSPRINT CONSUMPTION:
- Definition: The consumption of newsprint in metric tons per 1000 inhabitants in 1980, "refers to domestic production plus imports minus exports. The term newsprint 'designates the bleached, unsized or slack size printed paper of the type usually used for newspapers'". (UNRISD 1977, 103.)

- Source: UN (1981).

RADIO RECEIVERS:
- Definition: Radio receivers per 1000 inhabitants in 1979 "shows the number of licenses issued or the estimated number of receivers in use. The term 'radio receiver' relates to all types of receivers connected to a redistribution system. It includes private radio receivers in the home, car radios, protable radio sets, private sets instaled in public places, and communal receivers." (UNRISD 1977, 107.)

- Source: UN (1981).

TELEPHONES:
- Definition: Telephones per 100 inhabitants in 1980 relates "to the number of public and private telephones installed which are connected to a central exchange". (UNRISD 1977, 105.)

- Source: UN (1981).

SAFE WATER:
- Definition: The indicator 'safe water supply' gives the percentage share of the population with reasonable access to "treated surface waters or untreated but uncontaminated water such as water from protected boreholes, springs and sanitary wells. Other waters of doubtful quality are qualified as unsafe". (UNRISD 1977, 99.)

- Source: World Bank (1982).

- Note: Only 1975 data are available.

GDP PER CAPITA:

- Definition: This indicator gives the value per capita of the gross domestic production 1980 at constant 1975 prices and 1975 dollar exchange rate.

- Source: Handbook of World Development Statistics 1982.

MVA PER CAPITA:

- Definition: The indicator shows the per capita manufacturing value-added in 1980 at constant 1975 prices and 1975 dollar exchange rate.

- Source: UNIDO data bank.

GFCF PER CAPITA:

- Definition: This indicator gives the value per capita of the gross fixed capital formation in 1980 at constant 1975 prices and 1975 dollar exchange rate.

- Source: UNIDO data bank.

APPENDIX 2

COUNTRIES AND TERRITORIES INCLUDED IN THE 1980 SURVEY

REGION I (NORTH AMERICA): Canada, United States of America.

REGION II (WESTERN EUROPE): Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland, Spain, United Kingdom.

REGION III (EASTERN EUROPE): Albania, Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, Union of Soviet Socialist Republics.

REGION IV (JAPAN): Japan.

REGION V (OTHER DEVELOPED ECONOMIES): Australia, New Zealand.

REGION VI (LATIN AMERICA): Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

REGION VII (SUB-SAHARAN AFRICA): Angola, Benin, Burundi, Cameroon, Central African Republic, Chad, Congo, Ethiopia, Ghana, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Togo, Tanzania, Uganda, Upper Volta, Zaire, Zambia, Zimbabwe.

REGION VIII (NORTH AFRICA AND MIDDLE EAST): Algeria, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Libyan Arab Jamahiriya, Morocco, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Yemen.

REGION IX (SOUTH ASIA): Afghanistan, Bangladesh, Burma, India, Nepal, Pakistan, Sri Lanka.

REGION X (SOUTH-EAST ASIA): Hong Kong, Indonesia, Republic of Korea, Malaysia, Papua New Guinea, Philippines, Singapore, Thailand.

REGION XI (CENTRAL PLANNED ECONOMIES, ASIA): China, Kampuchea, Democratic People's Republic of Korea, Laos People's Democratic Republic, Mongolia, Viet Nam.

REGION XII (OTHER ECONOMIES): Israel, Yugoslavia, Turkey, South Africa.

APPENDIX 3

COUNTRIES AND TERRITORIES INCLUDED IN THE CROSS-CORRELATION SAMPLE

NORTH: United States of America, France, Federal Republic of Germany, Netherlands, Norway, Turkey, United Kingdom, Hungary, Poland, Romania, Union of Soviet Socialist Republics, Japan, New Zealand.

SOUTH: Argentina, Brazil, Costa Rica, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, Venezuela, Ivory Coast, Mali, Mauritania, Rwanda, Senegal, Tanzania, Togo, Zambia, Egypt, Islamic Republic of Iran, Jordan, Morocco, Sudan, Syrian Arab Republic, Tunisia, Yemen, Afghanistan, Burma, India, Nepal, Pakistan, Hong Kong, Indonesia, Republic of Korea, Malaysia, Philippines, Singapore, Thailand.

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